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The TRMM Precipitation Data Set

by H. Lee Kyle

with William Teng, Long Chiu, Erich Stocker, Michael McCumber, and Christian Kummerow

The TRMM Program

Tropical rainfall makes up more than two-thirds of the global rainfall. It is the primary distributor of heat through the circulation of the atmosphere. Understanding rainfall and its variability is crucial to understanding global climate and predicting possible future climate changes. Launched November 28, 1997, the Tropical Rainfall Measuring Mission (TRMM) satellite is an important tool to better measure rainfall over the area between 38° north and south latitudes. Its measurements also help scientists better understand how rainfall releases heat energy to drive atmospheric circulation. The satellite's two most important rain measurements instruments are the Precipitation Radar (PR) and the TRMM Microwave Imager (TMI). TMI is a multichannel radiometer whose channel signals in combination can measure rainfall quite accurately over oceans and somewhat less accurately over land. PR can determine the vertical distribution of precipitation by measuring the radar reflectivity of the cloud system and the weakening of the signal as it passes through the precipitation. A unique feature of PR is the measure-

ment of rain over land, where passive microwave channels have more difficulty. It can also measure the rain rate at various levels in the atmosphere. The TRMM satellite data sets start in December 1997 and are still continuing to be compiled.

Rain is one of our most vital resources but the measurement of regional mean rainfall is a difficult scientific art. Surface rain gauges, if well designed and cared for, give accurate point measurements. But rainfall can vary a great deal in only a short distance, and it is strongly influenced by regional weather patterns and topography. Over the oceans and over many large land areas the rain gauge network is too sparse to yield accurate regional average rainfall. Satellite based remote sensing instruments can provide good spatial and temporal monitoring of the entire globe. But the derivation of rainfall from the sensor measurements is influenced by local conditions and geography. For instance, TMI measures rain less accurately over land than over ocean. Thus, an important part of the TRMM program consists of a series of regional field experiments in which rain gauge and ground radar measurements are compared with temporally

and spatially collocated aircraft and satellite measurements. These field experiments yield important regional climate information and are also used to better understand how the satellite sensor measurements relate to rainfall under various observing conditions. Diurnal sampling is an important factor. The TRMM satellite is in a non-Sun-synchronous orbit inclined at 35° to the equator; thus, it samples regional rain rates at various times of day throughout the month. Diurnal estimates can be improved by incorporating information from other weather satellites, particularly the geosynchronous ones.

TRMM is a joint project between the United States and Japan. The National Space Development Agency of Japan (NASDA) provided the PR instrument and the H-II rocket to launch the TRMM observatory. NASA's Goddard Space Flight Center (GSFC) in Greenbelt, MD, provided the TRMM observatory, TMI, the Visible Infrared Scanner (VIRS), and two other instruments, integration and testing of the observatory, and operation of the TRMM satellite. A TRMM Science Team oversees the program and provides the scientific processing algo-

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rithms. Chris Kummerow, U.S. TRMM Project Scientist, of the Mesoscale Atmospheric Processes Branch, is the official science contact at GSFC. The GSFC Global Change Data Center, headed by Stephen Wharton, is responsible for both the processing of the scientific data products and the archiving and distribution of these products to the public. The scientific processing is done by the TRMM Science Data and Information System (TSDIS) headed by Erich Stocker. In parallel and using the same algorithms, the Japanese also produce the science products from the PR instrument. The archiving and distribution of the data are handled by the Hydrology Data Support Team (DST) led by Bill Teng. This team is part of the GSFC Earth Sciences (GES) Distributed Active Archive Center (DAAC). The Hydrology DST does some additional data processing such as the creation of the gridded orbital rain products and the extraction of the most used parameters as subsets.

TRMM Data

The TRMM data collection includes raw and calibrated instrument measurements and several types of rain estimates. Separate rain estimates are made from the radar (PR) and the microwave (TMI) measurements, and then the two sets are combined to give a third estimate. The instantaneous measurements are grouped by orbits, each of which is 91.5 minutes long, by days, months, and years. The PR instrument has a 220 km swath width and a nadir surface footprint of 4.3 km. TMI has a swath width of 760 km and channel footprints that range between 5 km at 85.5 GHz to 45 km at 10.65 GHz. Orbital rain products are

available from TMI at a 5 km horizontal resolution and from PR at a 4 km resolution. Combined PR-TMI rain rate and path-integrated attenuation at 4 km horizontal and 250 m vertical resolution are available over a 220 km swath. Gridded orbital data are available from some parameters including the combined rain estimate. Subsampled VIRS radiances for all five visible and infrared channels are available on a 0.25° grid. Just the pixels nearest to grid center are chosen. The instantaneous area rain averages are available on two global grid mesh sizes: 0.1° and 0.5°.

TSDIS does produce instantaneous VIRS brightness temperatures and PR, TMI, and combined rain averages on a 0.5° x 0.5° global hourly grid. These are generated for each hour of the day. During a given hour, data are present only in the few grid squares observed that hour. Over Africa and South America, TSDIS also produces hourly land rain measurements on a 0.1° x 0.1° grid. The data are in ASCII files and are not identical to the gridded orbital products available from GES DAAC. These particular TSDIS products are not sent to GES DAAC for distribution, but they can be obtained over the Web at

<ftp://aeolus.nascom.nasa.gov/>.

The TRMM time averages normally are made over larger areas to obtain greater reliability. The products are available on global grids that extend from 40° N to 40° S. The grid size varies with the product and can be as small as 0.5° or as large as 5°. The combined PR and TMI rainfall data set is on a 5° x 5° grid. For the period February 1998 to the present, it includes rain rate, cloud liquid water, rain water, cloud ice, and graupel at 14 levels.

For validation purposes ground radar and rain gauge data are available from four sites: Houston, TX; Kwaja-

lein; and Melbourne and Darwin, Australia. The rain gauge data consist of 1-minute averages and peak rain rate values.

Combined TRMM and Other Rain Measurements

Even with the non-Sun-synchronous orbit of the TRMM satellite, it is difficult to get accurate monthly diurnal rain averages because of inadequate diurnal sampling. The geosynchronous weather satellites can yield adequate diurnal temporal sampling but they do not carry the advanced rain measuring instruments that TRMM has. Their rain estimates rely on infrared cloud measurements that indicate how cold the cloud tops are and thereby how high. They yield a statistical rain estimate because they do not actually measure rain itself. The TRMM VIRS instrument yields measurements that can be used to better combine TRMM TMI and PR measurements with the geosynchronous measurements. TRMM rain estimates can also be improved by combining them with the Special Sensor Microwave/Imager (SSM/I) microwave rain measurements from the Sun-synchronous Defense Meteorological Satellite Program (DMSP) satellites. The TRMM data collection includes 5-day average rain rates on a 1° x 1° grid from calibrated geosynchronous IR rain rates using TRMM estimates, and a monthly merged rain rate from TRMM, geosynchronous IR, SSM/I, and rain gauges. In the new Version 5 data set the 5-day averages will be replaced by 1-day averages.

Comparison data sets are also available. There is a monthly 1° x 1° SSM/I global rain rate data set for the period August 1998 to the present. The Global Precipitation Climatology Project (GPCP) Version 1c global precipitation

An expanded and updated version of *The Global Scanner* is available on our Web site at
http://daac.gsfc.nasa.gov/DAAC_DOCS/Newsletter

News of noteworthy events that occur in the interim between publication of this issue and the next will be posted there along with goodies we feel may be helpful to our users.
Be sure to visit the site from time to time.

The Data Base QA Updater

by
Richard H. Buss, Jr.



In October 1999, GES DAAC will officially release an Earth Observing System (EOS) science tool called Data Base QA (Quality Assurance) Updater, version 1.3. This UNIX system tool and its User's Guide are intended for use on the Version 5A.02 EOS Data and Information System (EOSDIS) Core Systems (ECS) at all NASA DAAC sites. With Data Base QA Updater, DAAC staff can set and update quality assurance metadata at the request of EOS related science teams or

at the direction of DAAC operations personnel.

Science teams can define the quality of their data with the QA metadata (Science Quality Flag Explanations) by specifying for themselves in free text and numbers the precise meaning for their measurement quality in terms of "passed," "failed," or "investigated." They then send in a formatted Email to their host DAAC so that the metadata in the data base reflects their current assessment and meaning of the sci-

entific quality of the data. A similar process is used for DAAC Operational Quality Assessment.

Interested EOS instrument teams can also learn from this release the format of the QA Update Request and some of the update process. However, the use of the tool is intended for DAAC operations QA personnel to fulfill science requests to update the quality assurance metadata in ECS data bases. By Emailing the Goddard DAAC, instrument teams can request a file containing the Primer for the QA Updates.

Other EOS DAACs can request the User's Guide for the tool. The guide contains comprehensive and detailed information on all aspects of the Data Base QA Updater, including an appendix that lists likely error conditions and possible methods of resolving them. For convenience, a configurable program, *QAupdate.csh*, is also available to automate processing of QA Update Requests. Further questions should be directed to Dr. Buss at 301-614-5485 or, preferably,

Richard.Buss@gsfc.nasa.gov.

The TRMM Precipitation Data Set continued

data set is available on a $2.5^\circ \times 2.5^\circ$ grid for the period July 1987 through March 1999. This recently revised data set combines satellite IR and SSM/I measurements with surface rain gauge results to obtain global rain measurements.

Coming — Improved TRMM Rain Measurements

The TRMM Science Team developed improved processing algorithms after carefully studying the instrument measurements and the products of the present Version 4 algorithms. In the near future, production of the new Version 5 products will start and that of Version 4 products will stop. It will take about 9 months to reprocess the older measurements to produce a com-

plete measurement set of Version 5 products. The important changes are as follows:

Level 1 data

PR has a 0.6 DBZ calibration change applied to Version 5. The new TMI Level 1 code corrects for a low temperature bias that was detected in TMI after careful comparisons with SSM/I and cold sky temperatures observed during two spacecraft rollover maneuvers.

Rain products

There is significant improvement, particularly in the passive microwave (TMI) and radar (PR) algorithms. The Version 5 products correct some of the early deficiencies in the algorithms. Agreement of the Version 5 products is

now within 10% for monthly tropical zonal mean rainfall statistics. In the present Version 4 the agreement is only within about 20%.

TRMM Field Experiments

Information about and data from six TRMM related field experiments are also available. These experiments included studies of the tropical oceans, the tropical Brazilian jungles, and Texas and Florida. Specifically, they included studies of the warm water pool in the western equatorial Pacific, of the Asian monsoons, of the effects of deforestation of the tropical rain forests, and the dynamics of hurricanes. Analysis is still underway for several of these experiments. These are cooperative experiments and some of the data are ar-

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New Data Products General News People in the News



DATA PRODUCTS AND SERVICES

GES DAAC Data Holdings Cover Many Areas

Atmospheric Chemistry

Ozone and other trace gas compositions, dynamics, and energy interactions of the upper atmosphere

Atmospheric Dynamics

3-D dynamic and thermodynamic state of the Earth-atmosphere system, from satellite measurements and assimilation systems

Field Experiments

Aircraft and ground based measurements of meteorological variables designed to improve science algorithms and validate satellite-derived data products

Hydrology

Global precipitation, its variability, and associated latent heating, important for studying the global hydrological cycle, climate modeling, and applications

Interdisciplinary

Global land, ocean, and atmospheric parameters mapped to uniform spatial and temporal scales for basic research and applications studies

Land Biosphere

Long time-series vegetation and thermal infrared brightness temperature data sets for global change research

Ocean Color

Remote sensing ocean color data used to investigate ocean productivity, marine optical properties, and

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chived at other sites. However, in these cases experiment information and links to these other sites can be found through the Field Experiment page at the GES DAAC Web site given below.

Inquiries Are Welcomed

The TRMM data sets are available free of charge to the public. If you are interested, please visit the GES DAAC Web site. This site also allows you to place data orders and directly download some data files. GES DAAC also welcomes Email, phone, or FAX inquiries. Those interested chiefly in the scientific contacts should also check the TRMM Home Page.

References

- Kummerow, C., W. Barnes, T. Kozu, J. Shiue, and J. Simpson. 1998. The Tropical Rainfall Measuring Mission (TRMM) sensor package, *J. Atmos. and Ocean Tech.*, 15:808-816.
- Simpson, J., C. Kummerow, W. K. Tao, and R. F. Adler. 1996. On the Tropical Rainfall Measuring Mission (TRMM), *Meteorol. and Atmos. Phys.*, 60:19-36.

URLs

GES DAAC Home Page: a summary of chief center holdings

<http://daac.gsfc.nasa.gov/>

For TRMM data and accompanying documentation, click on Hydrology.

TRMM Field Experiment information and data

http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/TRMM_FE/trmm_fe.html

TRMM Home Page

<http://trmm.gsfc.nasa.gov/>

Science data processing:

TRMM Science Data and Information System (TSDIS)

<http://gcdc.gsfc.nasa.gov/tsdis/tsdis.html>

Japanese TRMM page

http://yyy.tksa.nasda.go.jp/Home/Earth_Obs/e/trmm_e.html

Information can also be obtained by

phone: 301-614-5224 (voice)

FAX: 301-614-5968

Email: daacuso@daac.gsfc.nasa.gov

the interaction of winds and currents with ocean biology

MODIS Data Support Home Page

There will be no MODIS data until some time after the launch of the satellite Terra. The MODIS Data Support Team is preparing to assist the public and private sectors alike with an abundance of services to help maintain a consistent flow of support for MODIS data handlers. Those interested in the future use of MODIS data should check here.

For more details about the GES DAAC data holdings and to order data see our Home Page or contact us by Email, phone, or FAX.

<http://daac.gsfc.nasa.gov/>

Email: daacuso@daac.gsfc.nasa.gov

voice: 301-614-5224

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GENERAL NEWS

November 23, 1999, Is Tentative Terra Launch Date

The launch of the MODIS Proto-flight Model (PFM) instrument, which will fly aboard the Terra (EOS AM-1) spacecraft has been postponed. The revised launch data for Terra is now tentatively November 23, 1999. Various problems have caused the delay. For the latest update on the launch schedule, check "NASA MISSIONS Launch Schedule" at

<http://www-pao.ksc.nasa.gov/kscpao/schedule/mixfleet.htm>

Rob Simmon's Visualizations Are in the News

The Terra Viz (Visualization) Team contributed some materials to the documentary "Understanding Fire," which aired Saturday June 26 at 10 p.m. on the Learning Channel. The program was an overview of the science of fire, including information about the chemistry of fire, pyrotechnics, and wildfire. Rob contributed an animation of 10-

day global fire data overlaid on Normalized Differential Vegetation Index data (archived at the Goddard DAAC) from April 1992-December 1993.

Dr. Steve Goodman, Senior Scientist at Marshall Space Flight Center, presented new research results about the lightning activity associated with tornados on "Good Morning America," which aired August 18. He highlighted a 3-D visualization combining TRMM Lightning Imaging Sensor and Visible Infrared Sensor data, also produced by Rob. The animation illustrated the relationship between lightning activity and strong convection (cold, high cloud tops) in a thunderstorm system over Oklahoma and Texas.

Rob has also contributed to NASA's Earth Observatory Web site,

<http://earthobservatory.nasa.gov>

The September 1999 issue of Popular Science lists this site as one of the "50 Best of the Web" for its excellent science and technology content. The site was conceived by David Herring of Goddard's Climate and Radiation Branch. It features the artistic efforts of several people including our Rob. The site provides a sophisticated and interactive Web environment where the public can learn about climate and environmental changes on our planet as observed and measured by various NASA satellites. Since the Web site was launched on April 29, 1999, it has received about 1.6 million hits from people in more than 80 countries.

Ocean Color News

Check out the new Science Focus section at

http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/OCDST/science_focus.html

This features short discussions of oceanic phenomena illustrated with SeaWiFS images and explained with text and graphics. The first three presentations discuss

- Asian dust over the Pacific
- the Charleston Bump off South Carolina

- a clear day over the Agulhas (7/22/1999), the ocean off the Cape of Good Hope.

Suggestions for future Science Focus topics are welcome. Send them to ocean@daac.gsfc.nasa.gov.

Ocean Color Spectrum is a collaboration between the Alliance for Marine Remote Sensing, publishers of *Backscatter* magazine, and the Goddard DAAC Ocean Color Data Support Team. Various types of newsworthy information are compiled for inclusion in the magazine, along with accompanying figures or pictures. The Goddard DAAC sends out an Email (text) version of "Ocean Color Spectrum" at about the same time that the current issue of *Backscatter* is released.

Presentations

On July 13, GES DAAC's Steven Kempler actively participated in the Earth Science Information Partnerships (ESIPs) Federation Meeting: Progress and Future Prospects presentations held at the American Geophysical Union in Washington, DC. The purpose of this day of presentations was to describe the progress and direction of the ESIPs in federating for the purpose of promoting Earth science information systems for facilitating the use of Earth science data. Steve, as part of the Planning Committee for this day, coordinated the session entitled "Technological Contributions of the ESIP Federation," which included six speakers talking about interoperability, data subsetting, and data mining. Steve gave the presentation on subsetting entitled "Fostering the Use of Data Level Subsetting Technologies for Earth Science Data."

Gregory Leptoukh participated in the IEEE Geoscience and Remote Sensing Symposium (IGARSS'99), June 28-July 2 in Hamburg, Germany. Greg presented a paper entitled "Earth Science Data Archive and Access at the NASA Goddard Space Flight Center Distributed Active Archive Center

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(DAAC)" in the Data Standards and Distribution section. As a result of attending this conference, Greg established contacts with the European ENVISAT project. The ENVISAT platform (to be launched in 2000) will carry onboard a number of instruments similar to those of Terra including the Medium Resolution Spectrometer (MERIS), which is considered to be ENVISAT's counterpart to our MODIS. Greg also established contacts with ENVISAT validation and MERIS data processing and distribution projects.

Hualan Rui presented a poster paper written by herself, Bill Teng, A.K. Sharma, and Long Chiu entitled "NASA Goddard DAAC Hierarchical Search and Order System for TRMM Data: a Web Based Approach" at the IUGG'99 (International Union of Geodesy and Geophysics) meeting, July 26-30, 1999, in Birmingham, England.

Long Chiu presented a paper written by himself, Nathan Pollack, George

Serafino, Bill Teng, and David Wong entitled "Disseminating National Aeronautics and Space Administration (NASA) Earth Remotely Sensed Data to the Agriculture and Natural Resource Management Communities" at ISAS'99/SCI'99 (Information Systems Analysis and Synthesis/Systemics, Cybernetics, and Informatics), July 31-August 4, 1999, in Orlando, FL. Discussions there resulted in two important contacts: EUMETSAT, where a LADC-like effort is ongoing, and U.

Washington, whose representatives expressed interest in the university's becoming a Land Application Data Center (LADC).

Gilberto Vicente gave an oral presentation on the paper entitled "The Role of Orograph and Parallax Corrections on High Resolution Geostationary Satellite Rainfall Estimates for Flash Flood Applications" at the 1999 EUMETSAT Meteorological Satellite Data User's Conference, September 6-10, in Copenhagen, Denmark.

DATA HANDLED IN GIGABYTES DURING 1999

Month	INGESTED			DISTRIBUTED			
	TRMM	Other	Total	ftp	Media	CDs	Total
JAN	604.9	61.7	668	345.5	1444.3	3615.9	5406
FEB	614.9	52.0	667	363.4	1468.5	7030.4	8862
MAR	571.8	86.2	658	304.8	2591.0	5736.2	8632
APR	347.7	58.2	406	478.4	1927.2	4827.7	7233
MAY	371.9	158.5	530	336.0	1139.4	4184.3	5660
JUN	242.7	125.0	368	259.0	2288.5	2476.5	5024
JUL	249.0	80.4	329	382.2	1362.0	2531.0	4275
AUG	279.7	130.5	410	599.6	2759.4	1680.9	5040
SEP	251.0	81.8	332	357.5	2472.9	606.7	3437

PEOPLE IN THE NEWS

The Voice on the Phone: Frances Bergmann (a.k.a. Dinky) Takes on Additional Tasks

(She's already doing so much that she probably won't notice a few more work items.)

When the public contacts the GES DAAC Help Desk, Dinky answers and sets them on the correct road. Whether the requests come by old-fashioned post office mail, Email, phone, or fax, they come across Dinky's desk. In this new Web age, we at GES DAAC refer to these as "offline" requests. "Online" orders are those where the user just downloads the desired items from our Web site. But offline orders require some human intervention, and Dinky coordinates these.

Most requests are for DAAC data products, but some people want help reading or interpreting the data. Not

all requests are simple to handle or even to understand. For instance, the request, "I think some satellite data would help me in my work; what kind would you recommend?" requires both diplomacy and some polite but probing questions. Many callers are referred to various GES DAAC specialists or to other data centers and organizations. In the past, we have handled a few K-12 educational items. While we no longer have this responsibility, Dinky still gets plenty of calls from teachers and school children. These are generally referred to the Goddard Teachers' Resource Laboratory, but some Dinky can answer herself. In addition to all this, she keeps a record of all requests and helps with this newsletter.

Dinky came to Goddard in 1974 as dispatcher in a computer room. In those days, analysts submitted decks of punched cards at the "in" desk. After a

job was run, the dispatcher had the duty of seeing that the card deck and computer printout got back to the analyst's computer mailbox. After a little while in that role, she became a key-punch operator; a typist who created the computer cards from special programming forms submitted by the analysts.

In 1979 she joined the National Space Science Data Center (NSSDC) as a data tech. Here, among other things, she handled Voyager and Viking data. Those were the days when NSSDC was the official NASA data center for both Earth and space data. However, as the amount of satellite data increased, NASA made tentative efforts to set up a separate Earth Science data center (or centers). In the late 80s, the NASA Climate Data System (NCDS) was set up and Dinky went with it working under Lola Olsen. For

a year she was loaned to the Beltsville Agricultural Research Center where she inventoried a small mountain of 20 x 20 inch negatives that recorded the agricultural products of all the states.

She joined DAAC Operations in 1991 as NCDS began to merge into the GES DAAC. There she copied data onto tapes to fill data requests and performed system testing. From there she moved to the User Services section. This group talked to the customers then put the requested data on tape and mailed them out. Dinky was made manager of the Help Desk 4 years ago when the specialized Data Support Teams (DSTs) were set up to replace the User Services section. Each DST is knowledgeable about a particular type of data, and Dinky engages in constant interaction with these teams to resolve user problems or answer their queries.

Now Steve Kempler has announced that Dinky has also agreed to take on the role of Outreach Coordinator across GES DAAC. In this new role, Dinky primarily will (among other things)

- determine, in coordination with Data Support Team personnel, which conferences and outreach trips should have GES DAAC representation and what are the desired outcomes, and ensure that GES DAAC personnel can support these events as appropriate
- coordinate and publish user service metrics
- coordinate with offline data distributors on various activities
- be the GES DAAC representative for GES DAAC user services and outreach
- attend User Services Working Group telecons
- research and otherwise become familiar with user service and outreach organizations associated with other data centers.

As you know, Dinky has been doing a great job in her area of expertise. Hopefully these new tasks will offer new challenges. **Way to go, Dinky!**

Congratulations John Bay and Connie Li

Nolan Graham Bay, 8 lbs., 9 oz., was born at 4:08 a.m., July 22. He is their first child.

Catherine Harnden, Chairperson, EOSDIS DAAC OWG

Catherine was selected as chairperson for the EOSDIS DAAC Operations Working Group (OWG). In this capacity, she works closely with the EOSDIS project and other Earth sciences DAACs to define operations readiness criteria, provides leadership for DAAC preparations for the Terra launch, and ensures that ECS issues are addressed and being resolved that address operational readiness. Catherine's participation as OWG chair has been a welcome development by project and DAAC personnel alike.

Group Achievement Award Winners

Jim Acker, Greg Leptoukh, and George Serafino received a NASA Group Achievement Award with the SeaWiFS Project Science Team on July 16, 1999,

In recognition of your efforts to provide global ocean color data which is revolutionizing the field of biological oceanography while also serving to provide the first space-based depiction of our global biosphere.

Archiving and distributing the SeaWiFS data initiated the present GES DAAC Data Support Team concept. The Ocean Color Data Support Team (OCDST) of Jim, Greg, and George worked closely with SeaWiFS project staff to expedite the flow of data to the user community. SeaWiFS data were officially released on September 24, 1997, and were made available to the public through the GES DAAC 1 day

later. Since then, OCDST expanded its capability to monitor the incoming data stream, address and rapidly correct problems with incoming data, and reliably accept high data transfer volumes during data reprocessing. Furthermore, OCDST also created new tools to enable data users to examine and order SeaWiFS data products from GES DAAC. OCDST responded to both user needs and requests from the SeaWiFS project for improvements to the data distribution system.

To summarize, almost 2 years of SeaWiFS support by our Jim-Greg-George team has been a great success that serves as a model for data support for future missions maintained by GES DAAC.

Kudos to All at GES DAAC and the Global Change Data Center

by Stephen Wharton, GCDC Chief

The Goddard Earth Sciences Directorate Visiting Committee came in May and reviewed the activities of the Directorate. This is an external committee that, from time to time, reviews the activities of the Directorate and presents recommendations and comments on our programs and accomplishments. It is presently chaired by Professor Eric Barron of Penn State University. The Committee's Final Report, dated July 12, 1999, included the following statement under "Areas of Noteworthy Strengths."

The Directorate provides a critical service to the community by providing high quality data sets with easy access through the Global Change Data Center.

The credit for this accomplishment belongs to the civil servant and contractor staff who develop and operate the data and information systems (including GES DAAC) that make up the Global Change Data Center (GCDC).



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